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Assistance at mealtimes in hospital settings and rehabilitation units for patients (>65 years) from the perspective of patients, families and healthcare professionals: a mixed methods systematic review

Deborah Edwards, BSc (Hons), MPhil¹

Judith Carrier, RN, MSc, PGCE, Dip PP¹

Jane Hopkinson, RN, PhD²

1. The Wales Centre for Evidence-Based Care, a Collaborating Centre of the Joanna Briggs Institute, School of Healthcare Sciences, College of Biomedical and Life Sciences, Cardiff University, Eastgate House, 40-43 Newport Road, Cardiff University

2. School of Healthcare Sciences, College of Biomedical and Life Sciences, Cardiff University

Corresponding author: Deborah Edwards, School of Healthcare Sciences, College of Biomedical and Life Sciences, Cardiff University, Eastgate House (7th Floor), 40-43 Newport Road, CARDIFF, CF24 0AB
Email: edwardsdj@cardiff.ac.uk

Highlights

- Mealtimes should be viewed as high priority
- All healthcare staff should allow older patients (>65 years) to eat uninterrupted, providing support where required.
- Relatives/visitors should be allowed to support older patients (>65 years) patients during mealtimes
- Social interaction at mealtimes for older patients (>65 years) should be encouraged.
- Communication between all members of the multi-disciplinary team and between staff and volunteers is essential.

What is already known about the topic?

The prevalence of malnutrition for older adults (>65 years) admitted in hospitals is high and is associated with prolonged hospital stays and increased mortality, especially for those with chronic conditions.

Further nutritional problems are often encountered for such patients due to a reduced dietary intake.

A variety of initiatives have been developed to try to ensure that patients receive mealtime assistance so that dietary intake can be improved

What this paper adds?

This review demonstrates that any initiative that involves supporting the older patients (>65 years) with setting up the tray, having meals within reach, assistance with opening packaging is beneficial

Mealtime support could be provided by nurses, employed assistants, volunteers, relatives or visitors.

If nurses are to fulfil the role of mealtime assistance then mealtimes should be viewed as a high priority and all healthcare staff should limit other activities to allow patients to eat uninterrupted, providing support where required.

Abstract**Background:**

Malnutrition is one of the key issues affecting the health of older people (>65 years). With an aging population the problem is expected to increase further since the prevalence of malnutrition increases with age. Studies worldwide have identified that some older patients with good appetites do not receive sufficient nourishment because of inadequate feeding assistance. Mealtime assistance can enhance nutritional intake, clinical outcomes and patient experience.

Objectives/Aim: To determine the effectiveness of meal time assistance initiatives for improving nutritional intake and nutritional status for older adult patients (>65 years) in hospital settings and rehabilitation units. The review also sought to identify and explore the perceptions and experiences of older adult patients and those involved with their care.

Design: Mixed methods systematic review

Data Sources: A search of electronic databases to identify published studies (CINAHL, MEDLINE, British Nursing Index, Cochrane Central Register of Controlled Trials, EMBASE, PsychINFO, Web of Science (1998 to 2015) was conducted. Relevant journals were hand-searched and reference lists from retrieved studies were reviewed. The search was restricted to English language papers. The key words used were words that described meal time assistance for adult patients in hospital units or rehabilitation settings.

Review Methods: The review considered qualitative, quantitative and mixed methods studies that included interventions for mealtime assistance, observed mealtime assistance or discussed experiences of mealtime assistance with staff, patients, relatives, volunteers or stakeholders. Extraction of data was undertaken independently by two reviewers. A further two reviewers assessed the methodological quality against agreed criteria.

Findings: Twenty one publications covering 19 studies were included. Three aggregated mixed methods syntheses were developed: 1) Mealtimes should be viewed as high priority. 2a) Nursing staff, employed mealtime assistants, volunteers or relatives/visitors can help

with mealtime assistance. 2b) Social interaction at mealtimes should be encouraged. 3) Communication is essential.

Conclusions: A number of initiatives were identified which can be used to support older patients (>65 years) at mealtimes in hospital settings and rehabilitation units. However, no firm conclusions can be drawn in respect to the most effective initiatives. Initiatives with merit include those that encourage social interaction. Any initiative that involves supporting the older patient (>65 years) at mealtimes is beneficial. A potential way forward would be for nurses to focus on the training and support of volunteers and relatives to deliver mealtime assistance, whilst being available at mealtimes to support patients with complex nutritional needs.

1. Introduction

Malnutrition is one of the key issues affecting the health of older people (Wilson 2013). The World Health Organisation defines older people as those who are 65 years and older in developed countries (World Health Organization, 2012). Globally the number of people aged over 65 years is estimated to be over 2 billion by 2050 (United Nations 2013). With an aging population the problem is expected to increase further since the prevalence of malnutrition increases with age (Elia, 2015). This is because changes associated with the process of ageing contribute to the risk of malnutrition for example: chronic disease, poor dentition, dysphagia, as well as a variety of psychological, lifestyle and social factors (Hickson, 2006, Mogensen and DiMaria-Ghalili, 2015).

For older adults (>65 years) admitted to hospital, the prevalence of malnutrition has been reported as being as high as 60% (Agarwal et al., 2013). This is reported to be approximately 35% higher compared to those patients less than 65 years (Russell and Elia, 2014). This is an area of concern, as it is associated with prolonged hospital stays and increased morbidity (pressure ulcers, infections and falls) and mortality, especially for those with chronic conditions (Correia et al., 2014).

For the hospitalised older adult patient with pre-existing malnutrition, further nutritional problems are often encountered due to a reduced dietary intake. Poor food intake for older patients in hospital may be due to a wide range of issues for example: the effects of acute illness, poor appetite, nausea or vomiting, "nil by mouth" orders, medication side effects, catering limitations, swallowing and/or oral problems, difficulty with vision and opening containers, the placement of food out of patients' reach, limited access to snacks, and ethnic or religious food preferences (Milne et al., 2005). An examination of the international literature has shown that some older patients with good appetites do not receive sufficient nourishment because of inadequate assistance with feeding during mealtimes (Age Concern England, 2006, Age UK, 2013, Buys et al., 2013, Francis, 2013, Robinson et al., 2002, Tsang, 2008, Westergren et al., 2001, Wong et al., 2008, Xia and McCutcheon, 2006)

Mealtime assistance is defined as receiving help from another person to eat or to complete the eating process when a meal or snack is served (Westergren et al., 2001).

A variety of initiatives have been developed to try to ensure that patients receive mealtime assistance if required. Initiatives can focus on providing patients who need it with feeding assistance by healthcare staff or volunteers (Hickson et al., 2004, Walton et al., 2008).

Bradley and Rees, 2003 introduced the concept of providing meals on red trays for 'at risk' patients. This simple food practice initiative acts as a signal to healthcare staff, that those patients should receive support in eating their food. Two further initiatives are protected mealtimes and supervised dining rooms. During protected mealtimes, unnecessary or avoidable interruptions are discouraged so that patients are able to eat undisturbed and nursing staff are available to assist with feeding (Hospital Caterers Association, 2004). Having supervised dining rooms encourages social interaction between patients and creates an environment where verbal encouragement to eat can be given by healthcare staff (Wright et al., 2006).

The background literature has identified that mealtime assistance is an important and ongoing issue, as one way of tackling malnutrition in hospital for older patients (>65 years). Findings from previous reviews in this area have demonstrated that mealtime assistance has the potential to enhance nutritional intake, clinical outcomes, and patient experience (Green et al., 2011, Tassone et al., 2015, Wade and Flett, 2012, Weekes et al., 2009, Whitelock and Aromataris, 2013). These findings have been reported from across a wide variety of settings: two studies were conducted with hospitalised patients only (Tassone et al., 2015, Whitelock and Aromataris, 2013), three studies with patients in any healthcare/institutional environment (Green et al., 2011, Weekes et al., 2009) and one with patients from both hospital and rehabilitation settings (Wade and Flett, 2012).

All of the previous reviews have been quantitative in nature. Four of these included adults over 18 years of age (Green et al., 2011, Wade and Flett, 2012, Weekes et al., 2009, Whitelock and Aromataris, 2013) and one included patients >65 years of age (Tassone et al., 2015). Combining both quantitative and qualitative studies in the same review makes this the first mixed methods systematic review including both hospital settings and settings rehabilitation units to be conducted in this topic area for patients (> 65 years). A mixed methods review is important because quantitative studies inform us about what interventions work; but we also need to be able to reveal why something works and what factors are important for the intervention to work. The protocol [REDACTED] and full report of this systematic review ([REDACTED]) have already been published and this paper provides a summary of the main points of interest.

2 Methods

2.1 Aim

This current review sought to develop an aggregated synthesis of quantitative and qualitative data that will focus only on patients (>65 years) in hospital settings and rehabilitation units with regard to assistance at mealtimes. The specific question being asked was what goes on, what works and what do patients, families and healthcare professionals think about assistance at mealtimes?

2.2 Design

A mixed methods systematic review was conducted to identify, summarise and synthesise the findings of all relevant studies that investigated both the effectiveness of the varying types of mealtime assistance provided in both hospital settings and rehabilitation units and the views of patients, health care professionals, family members and volunteers on mealtime assistance for patients (>65 years).

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist has been followed for the reporting of this review (Moher et al., 2009).

2.3 Search strategy

2.3.1 Electronic searches

The databases searched for published material are shown in Figure 1 and an example of a full search using MEDLINE is provided in supplementary file 1.

Insert Figure 1 here

The European Journal of Clinical Nutrition and Journal of Clinical Nutrition were hand-searched. Reference lists from retrieved studies were reviewed to identify studies that could not be located through other search strategies. The search was restricted to English language papers.

All studies identified, were assessed for relevance based on the title and where available the abstract. When a definite decision could not be made based on the title or abstract alone, the full paper was obtained. These were assessed by two researchers against the inclusion criteria. Any disagreement was resolved by consultation with a third independent reviewer. A screening tool was developed by the reviewers to ensure consistency and equity across the screening process. The screening tool was based on the inclusion criteria (see below).

2.4 Inclusion / Exclusion Criteria

2.4.1 Population

Studies that included patients (>65 years) from any ethnic background in hospital settings including rehabilitation units, with any diagnosis were considered. In addition studies including or focusing on carers, family members, volunteers and healthcare professionals perspectives that related to this age group were also included.

Patients <65 years of age, artificial feeding such as patients obtaining their nutrition exclusively by enteral or parenteral means and patients residing in other healthcare settings such as nursing homes or long term care facilities were excluded.

2.4.2. Type of Interventions

Interventions included but were not limited to mealtime assistance initiatives (where patients are provided with feeding assistance by healthcare staff, volunteers or family members or carers), protected mealtimes, supervised dining rooms and food service practices for example; providing meals on coloured trays. Other initiatives that aimed to improve assistance as determined by the literature in the area were incorporated, as necessary. Intervention strategies that focused on promoting the identification of malnutrition e.g. nutritional screening were not included.

2.4.3 Phenomena of interest

Studies that identified and explored the perceptions and experiences of patients (>65 years) in hospital settings including rehabilitation units and those involved with their care with regard to assistance at mealtimes.

2.4.4. Types of outcome measures

The primary outcomes of interest were measures of improved nutritional intake and/or nutritional status. Secondary outcome measures were length of stay, post-operative complications, and all-cause mortality.

Studies were considered that identified or described assistance at mealtimes from the perspective of the patient, health care professionals, carer or family members.

2.4.5 Types of studies

The selection criteria for studies considered all quantitative designs, in order to determine the effectiveness of meal time assistance strategies and programmes. The review also considered all non-experimental study designs including but not limited to observational studies and descriptive studies. The qualitative component of the review considered studies that focused on qualitative data, but not limited to, designs such as phenomenology, grounded theory and ethnography.

2.5 Assessment of methodological quality

Studies meeting the inclusion criteria were quality assessed using the appropriate Joanna Briggs Institute checklists (Joanna Briggs Institute, 2014a), specific to types of identified studies. Assessments were undertaken by two reviewers independently, with any disagreements resolved by discussion with a third reviewer. When a study met a criterion for inclusion on each of the JBI appraisal a score of 1 was given. Where a particular point for inclusion was regarded as “unclear” it was given a score of 0. Where a particular point for inclusion was regarded as “not applicable” this point was taken off the total score

2.6 Data extraction

Data were extracted from papers included in the review using the appropriate Joanna Briggs Institute data extraction tools (Joanna Briggs Institute, 2014a). Two reviewers independently extracted data. Any disagreements were resolved by discussion with a third reviewer.

2.7 Data synthesis

The experimental studies included in this review used a range of different types of interventions to address a variety of outcomes, it was not possible to pool the results using the statistical meta-analysis processes. Quantitative findings from the experimental and descriptive observational studies have therefore been presented in a narrative form.

These studies were presented in narrative form and assigned a level of evidence (Joanna Briggs Institute, 2014b) based on study design (High – Level one, Moderate – Level two, Low - Level three, Very Low – Level four). For the translation of these studies into thematic representations for the purpose of mixed method synthesis the summary of the effectiveness data and quantitative descriptive data as presented narratively were extracted and synthesized findings generated.

A meta-synthesis of qualitative findings was undertaken. This was a three-staged process: initially all findings were rated according to their credibility (Unequivocal (U) , Credible (C) or Unsupported (Un)) and grouped, then categorized on the basis of similarity in meaning; finally a meta-synthesis was carried out to generate a single comprehensive set of findings.

Following the meta synthesis of the qualitative data, textual synthesis of effectiveness data and textual descriptive synthesis of quantitative data, the results were then presented as three aggregated syntheses (Joanna Briggs Institute, 2014a).

3 Results

A total of 24,039 potential papers were identified across the database searches. Twenty one publications covering 19 studies were included in the review (see Figure 2).

Insert Figure 2 here

3.1 *Description of studies*

Table 1 and 2 shows details of the 19 studies involving 11,929 participants that met the inclusion criteria for the review. The studies were conducted in the United Kingdom (n=7 studies, across 8 publications) and Australia (n=9), United States of America (n=2), and Canada (n=1 study, across 2 publications). The combined total of participants was 431 for the qualitative studies and 2790 for the quantitative studies. Two studies (across three publications) were conducted within rehabilitation units. The remaining studies were conducted within hospitals wards or units.

Insert table 1 and 2 here

Three different types of mealtime interventions were reported. Three studies investigated the effectiveness of employed assistants to facilitate patients eating and feeding at mealtimes (Duncan et al., 2006, Hickson et al., 2004, Young et al., 2013). Five studies investigated the effectiveness of using trained volunteers to provide mealtime assistance (Buys et al., 2013, Huxtable and Palmer, 2013, Manning et al., 2012, Robinson et al., 2002, Walton et al., 2008). Two studies (reported across three papers) investigated the effectiveness of patients eating in a dining room (Dube et al., 2007, Paquet et al., 2008, Wright et al., 2006).

For the experimental studies the outcomes examined the effect of the described intervention on energy intake, protein intake, nutritional status (which was measured using a variety of anthropometric measures, including weight, mid-arm circumference, mid-arm muscle circumference hand grip dynamometry and triceps skinfold thickness), biochemical markers (i.e. haemoglobin, lymphocyte count, serum albumin), length of stay in hospital, mortality rates, the number of post-operative complications and infection rates.

3.2 *Levels of Evidence*

The numbers of quantitative studies within each level are reported in table 3. Two studies were level 1 evidence (experimental designs), four studies level 2 (quasi-experimental design), three were level 3 (observational analytic designs) and five were level 4 (observational descriptive studies).

3.3 *Meta-synthesis (MS) of qualitative data*

Three synthesized findings were generated from the qualitative data (fifty-seven extracted findings and associated illustrations aggregated to form nine categories can found in supplementary file 2)

- Competing priorities and interruptions related to ward activities had a negative impact at mealtimes (MS1)
- Assistance at mealtimes from staff, relatives and volunteers is positive and helpful (MS2)
- Providing assistance at mealtimes can be challenging (MS3)

3.4 *Textual synthesis (TSE) of effectiveness data*

Four synthesised findings were generated from the effectiveness data (see table 4). A summary is shown below.

Effectiveness of volunteers (TSE1)

- Daily energy intake was significantly increased (Level 2c-Robinson et al., 2013)
- Lunch time energy intake was significantly increased (Level 4b-Manning et al., 2012)
- Lunch time protein intake (Level 3d-Manning et al., 2012, Level 3d-Wright et al., 2006), breakfast protein intake (Level 2d-Huxtable and Palmer, 2013) and daily protein intake (Level 3d-Manning et al., 2012, Level 3d-Wright et al., 2006) was significantly increased

Effectiveness of employed assistants (TSE2)

- Daily energy intake was significantly increased (Level 1c-Duncan et al., 2006)
- Nutritional status significantly improved (Level 1c-Duncan et al., 2006)
- Mortality four months post discharge significantly improved (Level 1c-Duncan et al., 2006)

Effectiveness of eating meals in a supervised dining room (TSE3)

- Lunch time energy intake was significantly increased (Level 2c-Hickson et al., 2004)

Effectiveness of eating in a communal dining room (TSE4)

- A positive link was demonstrated between the nature and type of social exchanges and the duration of time older patients' were in the dining room and their protein intake (Level 3e-Dube et al., 2007, Paquet et al., 2008).

3.5 Textual descriptive (TD) synthesis

The quantitative descriptive data was thematically analysed (see supplementary file S3) and eight synthesized findings were generated). A summary is shown below.

- A variety of assistive and supportive strategies can improve food intake, these can be delivered by volunteers, nurses, dietitians, visitors, and nutrition and food service assistants (TD1)
- Nurses were aware that clinical condition can have a negative impact on both appetite and food intake (TD2)
- Initiatives that focus on allowing patients sufficient time to eat are important as dietary intake can be encouraged (TD3)
- Eating in a communal dining room can improve food intake (TD4)
- Nurses are not always available to help at mealtimes for a variety of reasons (TD5)
- Non-clinical tasks at mealtimes can be reduced, but the number of interruptions can be increased when protected mealtimes initiatives are implemented to help patients (TD6)
- Communication between nursing staff and volunteers is important (TD7)
- Volunteers benefit from support (TD8)

3.6 Aggregated mixed methods synthesis

The three individual syntheses from the qualitative meta-syntheses, the four individual syntheses for the effectiveness data, and the eight individual textual descriptive syntheses were aggregated to provide three mixed methods syntheses.

- Aggregated synthesis 1 (MS1, TD2, TD3, TD5 and TD6)
 - Mealtimes should be viewed as high priority, all healthcare staff should limit other activities during mealtimes and allow patients (>65 years) to eat uninterrupted, providing support where required so that dietary intake can be encouraged
- Aggregated synthesis 2a (MS2, TD1, TSE1 and TSE2)
 - Nurses, employed mealtime assistants, volunteers, or relatives/visitors can help prepare the patient (>65 years) for meals in a number of ways, which can range from opening packages and cutting up food as well as physically feeding patients, this could have an impact on a range of clinical outcomes
- Aggregated synthesis 2b (TD4, TSE3 and TSE4)
 - Social interaction at mealtimes, including eating in a dining room for patients (>65 years) is effective in increasing food intake, energy and protein intake and could be encouraged
- Aggregated synthesis 3 (MS3, TD7 and TD8)
 - Training and ongoing support for volunteers is needed and communication between all members of the MDT, and between healthcare staff and volunteers is important

3.7 Implications for Practice

Recommendations were developed for each aggregated synthesis (see table 5). Grades of recommendation were assigned to each recommendation in accordance (Joanna Briggs Institute, 2014b)

3.8 Methodological quality

The included quantitative studies encompassed a range of study designs: randomised control trials (Duncan et al., 2006, Hickson et al., 2004), controlled trials (Robinson et al., 2002), quasi-experimental using two different comparison groups (Wright et al 2006), before and after studies (Huxtable and Palmer, 2013, Young et al., 2013), single group case series (Manning et al., 2012, Walton et al., 2008), observational studies without a control group (Dube et al., 2007, Paquet et al., 2008 - one study across two publications), cross sectional studies (Walton et al., 2012, Walton et al., 2013), observation study-case series (Tsang, 2008) and descriptive evaluation studies (Buys et al., 2013, Roberts et al., 2013, Robison et al., 2015 - one study across two publications). For the individual critical appraisal scores for these studies see table 6. The two RCTs scored 6 and 7 out of a potential 8. Questions 2 and 3 were not applicable as both the participants and the allocator will have to know the treatment allocation (feeding assistance). For comparable cohort/case-control studies and descriptive/case series studies questions 6 (follow-up period) and 7 (patient withdrawal) were not applicable for feeding assistance interventions, so the total score was out of eight. One study scored 2 as there was information provided for patient selection,

details of the outcome measures used or details of how the analysis was conducted (Robinson et al., 2012). The descriptive studies scored between one and five. None of the descriptive studies were based on a random or pseudo-random sample, only six studies clearly defined the criteria for inclusion and only two studies identified any confounding factors. Eight descriptive studies provided clear details of the outcome measures being used. It was only clear in seven of these studies that outcomes were measured in a clear way and three studies did not provide sufficient detail of the statistical analysis.

Two qualitative studies specified the qualitative methodology or underpinning philosophy being employed which was normalization process theory (Heaven et al., 2013) or action research methodology (Dickinson et al., 2008). The remaining six studies (across 7 publications) adopted a qualitative approach to data collection and analysis (Naithani et al., 2008, Roberts et al., 2014, Robison et al., 2015, Ross et al., 2011, Walton et al., 2006, Walton et al., 2013). For the individual critical appraisal scores for these studies see table 6. For the mixed method study by Manning et al., 2012, the only details provided for the qualitative component were that informal interviews were conducted with patients. The study that scored four (Roberts et al., 2014) was a mixed methods study and provided limited data on how the volunteers were recruited and the authors claims in the conclusions were unclear. Only one study provided a clear statement locating the researcher culturally or theoretically. None of the studies discussed the influence of the researcher on the research or vice-versa. Two studies did not give a clear representation of the participants voices, and there was insufficient data to provide an answer to this question for a further two studies.

4. Discussion

This mixed methods systematic review has considered assistance at mealtimes for patients (>65 years) in hospital settings and rehabilitation units: what goes on, what works and what do patients, families and healthcare professionals think about it?

4.1. What goes on?

This first aggregated synthesis established that mealtimes should be viewed as high priority and that nurses should limit other activities during mealtimes and allow patients (>65 years) to eat uninterrupted, providing support where required. It is well recognised in the UK and beyond that older people often need some form of mealtime assistance to enable them to meet their nutritional requirements in hospital (Age Concern England, 2006, Age UK, 2010, Council of Europe, 2003, Allison, 2012). Prioritising mealtime support is essential if adequate assistance and encouragement is to be provided. This review demonstrated that nurses are not always available to help patients at mealtimes for a variety of reasons, which include competing priorities and interruptions related to ward activities, such as administering drugs and completing paperwork. One recommendation of this review is that ward staff should avoid interrupting patients (>65 years) whilst they are eating and prioritize assisting with food where this is required (Grade A).

As well as providing practical support with the eating process, this review recommended that sufficient protected time needs to be provided so that patients (>65 years) have time to complete their meals (Grade A). Such activities can only occur if nurses limit other ward activities during mealtimes to reduce unnecessary interruptions. When mealtimes are not made high priority then nutritional intake suffers especially for those who are unwell or who

have a poor appetite. Another recommendation of this review therefore, is that ward staff could spend time with patients (>65 years) who are unwell or have a poor appetite, to encourage sufficient food intake where appropriate to the patient's condition (Grade B).

4.1.1. Protected mealtimes

As a way to address these issues many international reports recommend the implementation of protected mealtime initiatives (Age UK, 2010, Hospital Caterers Association, 2004, Council of Europe, 2003, National Patient Safety Agency, 2007) suggesting that these have the potential to contribute towards preventing under-nutrition for older people during hospitalisation (Age UK, 2010, Victorian State Government, 2014). It is evident from this review however, that protected mealtimes alone, cannot improve nutritional intake in older people in hospital. This concurs with findings from previous review (Wade et al., 2012) and government reports (SSentif, 2011, National Patient Safety Agency, 2007). Protected mealtimes appear to be most beneficial when all members of the MDT work together to make nutritional intake a priority. A further recommendation of this review then, is that there is a need for strategies to be put in place in hospital settings to ensure that protected mealtimes are successful (GRADE B).

4.2. *What works?*

From the second aggregated synthesis it was established that nurses, employed mealtime assistants, volunteers, or relatives/visitors can help prepare the patient (<65 years) for meals; this includes opening packages and cutting up food as well as physically feeding patients. It is important that the nutritional needs of patients (>65 years) in hospital settings and rehabilitation units are met (Age Concern England, 2006, Age UK, 2010). This mixed-methods review has shown that a variety of assistive and supportive strategies delivered by volunteers, nurses, dietitians, relatives/visitors, and nutrition and food service assistants is effective and helpful in increasing food intake for patients (>65 years) in both hospital and rehabilitation units.

4.2.1. Nurses and employed assistants

Previous reviews have suggested that there can be improvement in clinical outcomes when nurses and employed assistants are encouraged to provide support at mealtimes to support patients in hospital settings and rehabilitation units (Green et al., 2011, Tassone et al., 2015, Whitelock and Aromataris 2013, Wade and Flett, 2013, Weekes et al., 2009). The second aggregated synthesis within this review which was specific to patients (> 65 years) has found that the use of employed assistants has been shown to be effective in increasing energy intake and nutritional status in hospital settings. Limited data from one single study showed that the use of employed assistants with acute trauma patients undergoing surgery for a hip fracture were effective in increasing mortality (four months post discharge) in hospital settings. When nurses prioritise mealtimes and feeding assistance for patients (>65 years) this has a positive effect on both patients' and nursing staff as well as an improvement in clinical outcomes. It is therefore recommended that nurses and employed assistants should be encouraged to provide support at mealtimes to support patients (>65 years) in hospital settings and rehabilitation units (Grade A).

4.2.2. Trained volunteers

It has also been recommended that hospitals should use trained volunteers where appropriate to assist patients at mealtimes (Age Concern England, 2006, Age UK, 2010) and

that this can relieve some of the pressure on nurses and can improve the effectiveness of other initiatives, for example protected mealtimes and the red tray system (Age UK, 2010). A range of evidence from moderate to very low quality within this review as part of the second aggregated synthesis has shown that lunch time and daily energy intake, breakfast, lunch time and daily protein intake can be increased in o patients (>65 years) in hospital settings when trained volunteers are present to provide support. This concurs with findings from the review by Tassone et al., 2015 and the other reviews conducted across all adult patients in hospital settings (Whitelock and Aromataris 2013, Wade and Flett, 2013). Although more high quality research is needed to investigate this area further, it is still a recommendation of this review is that working with volunteers to provide mealtime support, should be encouraged (Grade A).

4.2.3. Family members, relatives and visitors

As well as receiving support from employed assistants or volunteers a number of reports have suggested that family members, relatives and visitors can offer assistance to patients at mealtimes (Age UK, 2010, Gentleman and Monghan, 2005, Patient and Client Council, 2011, Victorian State Government, 2014). This is encouraged as part of protected mealtimes across a number of hospitals. This review found that relatives support at mealtimes for patients (> 65 years) is positive and valued as they can help prepare the patient (>65 years) for meals in a number of ways, which can range from opening packages and cutting up food as well as physically feeding the patient. Additionally the findings acknowledged that learning strategies from the family could improve individual nutritional intake and nurses should be encouraged to discuss these strategies with family members where appropriate. A further recommendation of this review is that family members, relatives and visitors should be encouraged to visit at mealtimes to support patients (>65 years) in hospital settings and rehabilitation units. (Grade A). There was very limited information regarding this across the majority of research included in this review and an area that warrants further investigation.

4.2.4. Dining location

As well as providing patients with adequate nutrition, mealtimes are also an opportunity to encourage supportive social interaction amongst patients (Hospital Caterers Association, 2004). From the second aggregated syntheses it was shown that social interaction at mealtimes for patients (>65 years) is effective in increasing food intake, energy and protein intake, and should be encouraged. This concurs with findings of previous reviews that suggested that giving patients opportunities to consume meals in a communal dining room has the potential to increase food intake as well as providing a social environment for eating (Wade and Flett, 2013, Weekes et al., 2009, Whitelock and Aromataris 2013). Although there was limited numbers of studies reported for this initiative across this review and previous reviews. It can still be recommended that dining rooms could be used for mealtimes for patients (>65 years) in hospital settings and rehabilitation units (Grade B).

4.3. *What do patients, families and healthcare professionals think about it?*

This review identified that that healthcare staff, patients and relatives/visitors recognize that providing assistance at mealtimes can be challenging. This is especially true for volunteers as demonstrated in the third aggregated synthesis which established that volunteers felt that providing mealtime assistance to patients (>65 years) could be

challenging, particularly if the patients didn't want to eat, or if they were not informed which patients required assistance. It was also identified that training and ongoing support from other volunteers and healthcare staff was beneficial and this is aligned with one of the recommendations from the Hungry to be Heard campaigns (Age Concern England, 2006, Age UK, 2010). A further recommendation of this review is therefore that volunteers could be trained and that they have support mechanisms in place as part of volunteer mealtime assistance programme (Grade B).

Studies that have investigated the wider contribution that nurses make to nutrition care have demonstrated that a number of challenges exist. These studies consistently report a lack of knowledge, lack of clarity of their role in nutritional care and a lack of confidence in the effectiveness of nutritional care interventions (Hopkinson, 2015). Further findings from this review from the third aggregated synthesis found that healthcare staff identified that there was a lack of clarity around responsibility for feeding support. In particular communication and knowledge of nutrition care processes between disciplines was poor. Healthcare staff felt that these factors acted as potential barriers to nutritional care of elderly patients. Age UK, as part of the Hungry to be Heard campaigns recommend that all healthcare staff must become aware by understanding that every meal is important (Age Concern England, 2006, Age UK, 2010). In order to address these a final recommendation of this review is that all members of the MDT need to be aware of nutrition care processes and ensure that patients (>65 years) nutritional needs are identified and addressed as part of individual care plans. These plans could provide role clarity and identify individual responsibilities for meeting the nutritional needs of each older patient which can then be clearly communicated to volunteer staff by healthcare staff. (Grade B)

5. Implications for future research and practice

One of the recommendations of this mixed methods review is to encourage relatives/visitors to visit at mealtimes and to offer support to patients (>65 years) in hospital settings and rehabilitation units. Although this was observed to be happening and is actively encouraged as part of protected mealtimes across a number of hospitals this is not an area that has been the specific focus of primary research to date. There is an opportunity therefore, for future work to make a contribution to this area.

6. Limitations

The authors did not have access to the database CAB Abstracts and therefore it is possible that some of the food science/human nutrition literature may have been missed. The studies included in this review varied in methodological quality, which impacts on the overall results and conclusions that can be drawn. Only two RCTs were included with the majority of the quantitative studies being low quality level three studies using observational methods. Where observational methods alone were used patients and nurses may alter their behaviour from usual and where limited observers are available data could have been missed.

7. Conclusions

A number of initiatives were identified which can be used to support patients (>65 years) at mealtimes in hospital settings and rehabilitation units. However, no firm conclusions can be drawn in respect to the most effective initiatives. Initiatives with merit include those that

encourage social interaction either through the use of a dining room or employed staff or volunteers spending time with the patient (>65 years) during mealtimes. Any initiative that involves supporting the patients (> 65 years) with setting up the tray, having meals within reach, assistance with opening packaging is beneficial. These could be provided by nurses, employed assistants, volunteers, relatives or visitors. Whoever provides the support need to be aware that patients (>65 years) need to be allowed adequate time to eat. If nurses are to fulfil the role of mealtime assistance then mealtimes should be viewed as a high priority and all healthcare staff should limit other activities to allow patients to eat uninterrupted, providing support where required. Volunteers value training and support and clarification of their roles and responsibilities for supporting individual patients which would involve clear communication from nurses. A potential way forward would be for nurses to focus on the training and support of volunteers and relatives to deliver mealtime assistance, whilst being available at mealtimes to support patients with complex nutritional needs.

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Table 1: Included quantitative studies tables

Authors Setting	Study design	Participants details	Intervention/s Duration of study Outcomes assessed	Extracted Findings
Study 1 Robinson et al. (2002) USA Hospital	Mixed methods Controlled trial	Patients - Control (n=34) Patients - Intervention (n=34) Over 65 years Further details not reported	Volunteer Feeding Assistance 2 months % Energy intake	Those patients fed by volunteers had a significantly higher percentage mean energy intake of 58.88% compared to those fed by nursing staff of 32.45%, nearly doubling their intake ($p < 0.001$) with a mean difference of 26.43g (95% CI 15.76 to 37.10)
Study 2 Walton et al. (2008) Australia	Single group case series Pilot study	Patients (n=9) Volunteers (n=10) Nurses (n=13) Mean age 89 years(SD 4.6)	Volunteer feeding assistance 1 month Protein intake (g) Energy intake (KJ) % meeting nutritional requirements Experiences of volunteers, nurses and patients in relation to feeding assistance	Demonstrated non-significant increases in daily energy intake Daily protein intake and lunchtime by 10.1g ($p=0.015$) and 4.3g ($p=0.009$) respectively Type of feeding assistance The volunteers were observed doing numerous tasks at the mealtimes including opening food and beverage packets, removing lids, making drinks, opening supplements, moving the meal tray closer, rearranging the meal tray, feeding patients encouraging /prompting intake, providing social support and conversation at the meal, as well as providing written feedback for the nurses From the survey data, opening packages was identified as an important role to assist and encourage dietary intakes Barriers to providing feeding assistance From the survey data 54% of nurses expressed concern about a lack of time or staffing resources at mealtimes Facilitators to eating

				<p>Volunteers (76%) felt that there was enough time to assist and feed patients</p> <p>Facilitators to eating 12/14 of the volunteers felt that company at mealtimes positively influenced the patient food intakes</p>
<p>Study 3 Buys et al. (2013) USA</p> <p>Hospital</p>	Descriptive evaluation	<p>235 patient-volunteers encounter</p> <p>Older adults</p>	<p>Volunteer feeding assistance 39 months</p> <p>Tasks completed by the volunteer Time spent with each patient</p>	<p>Time to assist patients Mean time of interaction of volunteers with each patient was 47.8 minutes</p> <p>Type of feeding assistance Tasks completed by the volunteer and time spent with each patient from 235 patient-volunteer encounters were recorded. Most frequently performed volunteer tasks were social interaction (n=217, 93%), assistance with trays set up (n=162, 69%), prompting to eat (n=161, 68%), assistance with feeding (n=106, 45%), passing out trays (n=73, 31%).</p>
<p>Study 4 Huxtable & Palmer 2013 Australia</p> <p>Hospital</p>	Before and after study	<p>1632 observations Intervention n=833 / Control n=799 on 1012 hospitalised patients</p> <p>Intervention : 66 years (SD 18) Control: 65 years \pm 18</p>	<p>Protected mealtimes Volunteer feeding assistance 17 months</p> <p>Energy intake (KJ) Protein intake (g)</p> <p>Addressing barriers to consumption Interruptions Mealtime assistance</p>	<p>Non-significant increases in daily energy intake and in energy intake during breakfast or dinner time</p> <p>Mean protein intake for breakfast significantly increased by 2g (p=0.025)</p> <p>Interruptions Number of interruptions significantly increased (intervention n=228, 27%, control n=142, 18%), p=0.000</p> <p>Assistance by staff at lunchtimes Significantly more patients received help with feeding during mealtimes (intervention n=66, 29%, control 31 (15%), p<.0.05</p> <p>There were no significant differences in the number of patients needed assistance with set up, help with cutlery or meal cut up or being encouraged to eat</p>

				<p>The proportion of inpatients receiving feeding assistance when required nearly double post intervention, $p=0.002$</p> <p>Facilitators to eating - meals within reach More meals were within reach of the patient after the implementation of protected mealtimes (intervention $n=741$, 94%, control $n=700$, 89%) $p=0.000$</p> <p>Patients were more likely to consume at least half of the nutrient dense foods and drinks available if their meal was within reach, $p=0.003$</p> <p>Facilitators of feeding assistance -time to assist patients The median time until first assistance was received in those that required it at dinner improved by approx. 4 min after the implementation of protected mealtimes intervention, $p=0.008$</p> <p>Facilitators to eating Time to eat meal The number of minutes provided to eat the meal between delivery and collection improved after the implementation of protected mealtimes (intervention median 57 (17-146), control median 53 (26-95) $p=0.000$)</p>
<p>Study 5 Hickson et al. (2004) UK Hospital</p>	RCT	<p>Patients - Control ($n=300$) Patients - Intervention ($n=292$)</p> <p>All over 65 years</p>	<p>Healthcare feeding assistance 19 months</p> <p>Length of stay / Mortality Protein intake (g) Energy intake (KJ) Infection rates (number of antibiotics prescribed) Functional status (GS (kgf))</p>	<p>Non-significant increases in daily energy and protein intake</p> <p>No significant effects on weight or BMI, MAC, TSFT, NAMC, grip strength, serum albumin or length of stay</p> <p>Infection rates Those in the intervention group used on average 50% less IV or SC fluids than the control group, $p=0.03$ but no longer reached significance when controlling for gender and MAMC at baseline, $p=0.1$</p>

			<p>Nutritional status (MAC (cm), TSFT (mm), MAMC(cm), BMI(kg/m²), Weight (kg))</p> <p>Energy intake (KJ)</p> <p>Protein intake (g)</p> <p>Uptake mealtime assistance</p> <p>Interruptions</p>	<p>The average number of IV antibiotics prescribed was half the number for those in the intervention group compared to the control group, p=0.02. No longer reached significance when controlling for gender and MAMC at baseline, p=0.08</p> <p>Those in the intervention group were on IV antibiotics for a shorter time of 4 days compared to those in the control group which was 6 days, p=0.02. The difference in the total number of days on IV antibiotics increased in significance to p=0.007 when controlling for gender and MAMC at baseline</p>
<p>Study 6 Wright et al. (2006) UK</p> <p>Hospital</p>	<p>Quasi-experimental study using two different comparison groups</p>	<p>Patients - Intervention (n=30)</p> <p>Patients - Control (n=18)</p> <p>Median age =84</p>	<p>Supervised dining room</p> <p>6 weeks</p> <p>Control</p> <p>Meals at the bedside</p> <p>Energy intake (Kcal)</p> <p>Protein (g)</p> <p>Nutritional Status (Weight gain)</p>	<p>The mean energy intake at lunch time on weekdays was found to be significantly greater 129kcal (541.8kJ) for patients in the intervention group (p <0.013)</p> <p>Non-significant increases in daily protein intake</p> <p>No significant effects on weight</p>
<p>Study 7 Young et al. (2011) Australia</p> <p>Hospital</p>	<p>Before and after study</p> <p>Duration of study</p> <p>Pre intervention data – November 2007 to March 2008</p> <p>Post intervention data – January to June 2009</p>	<p>Patients</p> <p>Patients - Pre-intervention (n=115)</p> <p>Mean age 79.4 years (SD 7.9)</p> <p>Patients - Post-intervention (n=139)</p> <p>- Intervention 1 (n=39)</p> <p>- Intervention 2 (n= 58)</p> <p>- Intervention 3 (n= 42)</p> <p>Mean age 80.2 years (SD 8.1)</p>	<p>Intervention 1: (I1)</p> <p>Protected mealtimes</p> <p>Intervention 2: (I2)</p> <p>Additional assistant in nursing</p> <p>Intervention 3: Intervention 1 and 2 combined (I3)</p> <p>Pre intervention - 17 months</p> <p>Post-intervention – 6 months</p> <p>Energy intake(Kcal)</p>	<p>No significant differences in mean energy intakes</p> <p>When energy intake was compared with energy requirements significantly more patients from any of the intervention groups had adequate energy intake compared with pre-intervention patients (Odds ratio 3.4 95%CI 1.3-8.7, p=0.001), although no statistical difference was seen between any of the intervention groups, p=0.029.</p> <p>A trend toward improved protein intakes for patients in intervention</p> <p>Barriers of feeding assistance - Interruptions</p>

			Protein intake (g)	<p>No reduction in the occurrence of mealtime interruptions was observed (pre intervention group: 38% of patients interrupted, I1: 33%, I2: 22%, I3: 26%; p=0.18).</p> <p>Barriers of feeding assistance - nursing tasks during mealtimes</p> <p>A significant reduction in non-clinical nursing tasks at mealtimes in all interventions (Pre: 66%, I1: 27%, I2: 31%, I3: 36%; p<0.01).</p> <p>Facilitators of feeding assistance - Assistance by staff at lunchtimes</p> <p>A significant increase in mealtime assistance provided after the introduction of the interventions, with 30% of participants in the pre-intervention group receiving assistance at one or more meals on the study day, compared with 80% (I1), 79% (I2), (PM) and 76% (I3, p<0.01)</p>
<p>Study 8</p> <p>Duncan et al. (2006)</p> <p>UK</p> <p>Hospital</p>	RCT	<p>Patients - Control (n=165)</p> <p>Patients - Intervention: (n=153)</p> <p>Over 65 years</p>	<p>Healthcare feeding assistance</p> <p>Dietetic assistants</p> <p>3 years</p> <p>Post-operative mortality</p> <p>Inpatient and 4 month mortality</p> <p>Length of stay / Complication rate</p> <p>Energy intake (Kcal)</p> <p>Nutritional status (Hb(g/dl), lymphocyte count($\times 10^9/l$) Serum albumin(g/l)), Weight(kg), MAC(cm), TSFT(mm), Handgrip strength(Nm)</p>	<p>Significant increase in energy intake of 349kcal (1465.8kJ) per 24 hours for those in the intervention group compared to those patients in the control (p<0.001)</p> <p>No significant effects on weight, TST, handgrip strength, nutritional status, lymphocyte count, serum albumin</p> <p>Significant decrease in MAC (p=0.002) for those in the intervention group</p> <p>No statistical difference in length of stay or number of post-operative complications</p> <p>Only one study³¹ examined the number of Patients who were receiving mealtime assistance from dietetic assistants were significantly less likely to die while they were in the acute trauma unit, p=0.048 or four months post discharge, p=0.036 than those receiving usual care, p=0.048.</p>

<p>Study 9 Roberts et al. (2014) UK</p> <p>Hospital</p>	<p>Mixed methods <i>Quantitative component</i> Survey</p>	<p>Volunteers (n=29)</p>	<p>Volunteer mealtime assistance 1 year</p> <p>Feasibility of delivering mealtime assistance</p>	<p>Type of feeding assistance Mealtime assistance included encouragement to eat, support with opening packets and setting up the meal tray, cutting up food, helping guide the food to the patient's mouth and actually feeding patients.</p> <p>Experience of volunteers Twenty-two (76%) of the trained volunteers delivered mealtime assistance one day each week, seven (24%) volunteered on two days. Over the year, the volunteers assisted on 229 weekday lunchtimes with 3911 (76%) patients on the ward received assistance over the year. Mean duration of mealtime assistance by volunteers was 5.5 months (range 1–11 months); seven (24%) volunteers assisted for at least 10 months.</p> <p>Training and support for volunteers Eighteen volunteers (62%) required little input, were confident in their role and able to support less experienced mealtime assistants. Eight (28%) were less confident, needed supervision and guidance on occasion and help with completing paperwork, three (10%) needed guidance.</p>
<p>Study 10 Walton et al. (2013) Australia</p> <p>Rehabilitation Unit</p>	<p>Mixed methods <i>Quantitative component</i> Survey</p> <p><i>Qualitative component</i> Overt observations in each location were undertaken over 2 days</p>	<p><i>Quantitative component</i> Nurses (n=10) / Doctor (n=1) Patients (n=11)</p> <p>Qualitative component Patients (n=33)</p> <p>Mean age 79.2 years (SD 9.2) for admission were cerebrovascular accident or a fracture</p>	<p>No intervention</p> <p>Factors affected food consumption Access to food between meals, barriers to food intake, time available for eating, assistance to eat, food quality, food brought by relatives and friends, and overall satisfaction with the food services provided</p>	<p>11% of staff stated that 'there was not enough time' to allow them to identify patients that need assistance 25% felt that there 'wasn't adequate' time to to assist patients in a timely manner,</p> <p>Barriers to eating identified by nurses Patients being unwell, having a poor appetite, the high level of packaging of the food, the presentation of the meals and the eating environment (i.e. in a ward rather than a dining room).</p>

				<p>Observations of mealtimes revealed that opening food and beverage packaging was the largest negative factor at each main meal (breakfast 40%, lunch 33%, tea 34%). Other factors included inappropriate tray and/or patient position meal (breakfast 22%, lunch 18.5%, tea 16%)</p> <p>Barriers of feeding assistance - negative interruptions: Medication rounds, X-rays being scheduled at lunch time, physiotherapist visiting, OT visiting, doctor visiting (Breakfast 0%, lunch 8%, tea 0%)</p> <p>Facilitators of feeding assistance - positive interruptions: Dietitian, visitors, additional food provided by doctor, nutrition assistant (Breakfast 14.5%, lunch 2%, tea .0%)</p> <p>Facilitators of feeding assistance - time to eat: most Patients (70%) indicated that they were given enough time with their meals</p> <p>There was a statistically significant difference between the times from tray delivery to commencement of meal taken to start breakfast, $p=0.040$</p> <p>Type of assistance: The bedside was the most common location for consuming meals. Two of the three sites had a dining room which was utilised frequently at lunch and tea. Improved intakes were observed when patients ate together in a dining</p> <p>Facilitators to eating- Location</p> <p>40% of patients preferred to use a dining room when available</p>
Study 11 Tsang 2008 Australia	Observational study (case series)	Patients (n=46) Mean age 86.5 years (SD 4.8)	No intervention Adequacy of eating assistance	Types of assistance Levels of feeding assistance categorised Total independence (TI)- Patient requires no assistance from nursing staff after receiving tray. 14 (30%) of patients were TI

			<p>Patients eating behaviours, type of eating assistance and percentage of patients receiving feeding assistance, staff time spent providing feeding assistance, caregivers providing feeding assistance per meal, time patients required to finish meal and tray access time and meal duration</p>	<p>Partial independence (PI)- Self-feeding is demonstrated but requires help with tasks. 23 (50%) of patients were PI and of those 20 (87%) actually received help that they needed.</p> <p>Total dependence (TD)- An inability to self-feed was demonstrated. Patient required intensive levels of physical assistance and/or verbal guidance to be able to eat. 9(20%) of patients required were.</p> <p>Staffing levels</p> <p>Breakfast was the busiest time in the day for staff as it had the lowest percentage of TI patients compared with lunch and dinner. Lunch time was the least busy meal. At lunch time, there were only 10% TD patients and up to 35% of the patients were TI in eating. Although there was usually help from relatives, the evening mealtime was very difficult as there was a smaller number of nursing staff with a higher percentage of TD (15%)</p> <p>Time for assistance</p> <p>Nurse assistants were the main providers of eating assistance in the ward. They spent a total of 85 minutes per day on eating assistance. A total of 123-minute assistance time was provided by all grades of nursing staff</p> <p>Time needed for assisting TD patients was nearly four times longer than for the PD patients. (PD: Breakfast 3.7 mins, Lunch 4.5 mins,, Dinner 3.8 mins / TD; Breakfast 15.7 mins, Lunch 16.7 mins, Dinner 10.8 mins)</p> <p>The average numbers of patients who were TI, PD, TD at mealtimes were 7, 12 and 3 per meal, respectively.</p>
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<p>Study 12 Walton et al. (2012) Australia</p> <p>Rehabilitation Units</p>	<p>Cross Sectional Survey</p>	<p>Dietitians (n=92) Food Service Managers (n=58) Nurse Unit Managers (n=68)</p>	<p>No intervention</p> <p>Current practices Perceived barriers Priority opportunities to enhance nutrition support</p>	<p>Time for assistance Mean reported time available for each main meal was 40 minutes, 98.5% of nurses felt that they had adequate time to assist and feed patients who required it.</p> <p>Types of assistance 42% of patients required mealtime assistance.</p> <p>There was agreement that the setting up of patients to access their meals and assisting those unable to feed themselves is primarily the responsibility of nurses. Few dietitians (14.5%) or FSMs (21.5%) indicated that trained, non-nursing staff were available to assist with feeding at meals, only one site mentioned a volunteer feeding assistance programme.</p> <p>Fifty-five percent of dietitians and 59.5% of FSMs reported that some non-nursing feeding assistance was provided, most often by food service assistants and visitors.</p> <p>Facilitators for providing feeding assistance Main priorities for adequate hospital nutrition by combined stakeholders were:</p> <ul style="list-style-type: none"> - Additional feeding assistance by nurses - Non nursing feeding assistant available at meal - Additional assistance to set up for meals
<p>Study 13 Dube et al. (2007) Canada</p> <p>Rehabilitation Units</p>	<p>Repeated measures design (within-subject naturalistic study) Observational study</p>	<p>Patients (n=32) Mean 78.8 years</p>	<p>Communal Dining room All participants were assigned to one of six tables, where they ate all their meals in the company of up to three fellow patients</p> <p>Energy intake (Kcal)</p>	<p>Did not find a significant association between the nature and type of different social exchanges taking place whilst patients were eating in a communal dining room and patients' energy intake.</p> <p>A positive link between the nature and type of different social exchanges taking place</p>

			Protein intake (g)	<p>whilst patients were eating in a communal dining room and patients' protein intake. Patients' and providers' mutual reciprocation of their communal behaviours (e.g., agreeable behaviours responded to by agreeable behaviours) were predictive of more positive deviations from protein requirements (i.e higher protein intakes) ($p<0.005$).</p> <p>Protein intake was impacted by the duration of time patients were in the dining room, $p=0.0037$</p>
<p>Study 13 Paquet et al. (2009) Canada</p> <p>Rehabilitation Units</p> <p>Same study as Dube et al. (2007)</p>	See Dube et al. 2007 ²⁹	See Dube et al. 2007 ²⁹	See Dube et al. 2007 ²⁹	See Dube et al. (2007)
<p>Study 14 Manning et al. (2012) Australia</p> <p>Hospital</p>	<p>Mixed methods</p> <ul style="list-style-type: none"> - Single group case series - Descriptive survey with volunteers and nurses - Interviews with patients 	<p>Volunteers (n=10)</p> <p>Nurses (n=15)</p> <p>Patients (n=23)</p> <p>Mean 83.2 years (SD 8.9)</p>	<p>Volunteer feeding assistance</p> <p>Three collection periods over 6 months</p> <p>Protein intake (g)</p> <p>Energy intake (KJ)</p> <p>% meeting nutritional requirements</p> <p>Experiences of volunteers, nurses and patients in relation to feeding assistance</p>	<p>Non-significant increases in daily energy intake</p> <p>Average lunchtime energy intake increased significantly by 396 KCal ($p=0.005$).</p> <p>Average daily protein intake increased significantly by 8.7g ($p=0.004$).</p> <p>Average lunchtime protein 4.3g ($p=0.009$)</p>

Table 2: Included qualitative studies table

Authors	Methods	Participants details	Phenomena of interest	Extracted findings (Illustrations in supplemental file 2)
Study 10 Walton et al. (2013) Australia Rehabilitation Units	Mixed methods <i>Qualitative component</i> Overt observations in each location were undertaken over 2 days	Patients (n=33) Mean age 79.2 years (SD 9.2) for admission were cerebrovascular accident or a fracture	Factors associated with achieving adequate food consumption	Finding 1: Bedside was the most common eating location but dining rooms were utilised for mobile older patients (>65 years) (U) Finding 2: Assistance at meals was provided by staff older patients (>65 years) especially with regard to opening packages. (U) Finding 3: Additional assistance older patients (>65 years) was provided by relatives and seen as a positive interruption. (U) Finding 4: Social interaction with older patients (>65 years) at mealtimes can be positive. (U) Finding 5: Allied health rounds create interaction with older patients (>65 years) and can be positive. (U) Finding 6: Ward routines had a negative impact on mealtimes for older patients (>65 years). (U)
Study 17 Dickinson et al. (2008) UK Hospital	Action research Phase I Observations mealtimes (n=6) breakfast, lunch and supper) Staff Focus groups (n=3) Interviews (n=10) Relatives comments box Phase III Data from phase 1 fed back to staff and used to form an	Phase 1: Staff (n=19) / Patients (n=10) Phase 3: Staff (n=21) / Patients (n=4) Older patients (further details not reported)	Phase 1: Mealtime experience Phase III: : Factors contributing to assessment and monitoring of the nutritional intake and nutritional status of patients:	Finding 7: Qualified staff were often involved in other tasks during the mealtime and, therefore, unavailable to provide care to older patients (>65 years). (U) Finding 8: Older patients (>65 years) were aware of the limited number of staff available to provide help at mealtimes. (U) Finding 9: Relatives commented on the lack of attention to older patients' (>65 years) needs with food sometimes being out of reach. (U) Finding 10: Mealtimes were considered enjoyable following staff reflection and action learning on the process. (U)

	<p>action plan to develop a patient centred approach to mealtimes</p> <p>Phase III</p> <p>Staff Focus groups (n3)</p> <p>Patient interviews (n=4)</p>			<p>Finding 11: Changes made to nursing practice meant that qualified nurses were available to assist in mealtime care, this had a positive effect on both older patients' (>65 years) and staff mealtime experience. (U)</p> <p>Finding 12: Getting to know the older patients (>65 years) and taking the time to provide what was needed for individual patients' assessment emerged as a new aspect to assessment. (U)</p> <p>Finding 13: Working with older patients' (>65 years) families, learning strategies from them and communicating these to the rest of the team was important. (U)</p> <p>Finding 14: Staff able to prioritize nutritional care and be actively involved in mealtimes. They were then in a position to observe and monitor what older patients (>65 years) were eating and any difficulties they were experiencing. (U)</p>
<p>Study 18</p> <p>Heaven et al. (2013)</p> <p>UK</p> <p>Hospital</p>	<p>Focus group (n=1)</p> <p>Interviews (n=53)</p>	<p><i>Focus groups:</i></p> <p>Former patients (n=2) / Carers (n=3)</p> <p><i>Interviews</i></p> <p>Catering staff (n=9) / Senior clinical staff (n=19)</p> <p>Frontline ward staff (n=10)</p> <p>PAMS (n=9) / Stakeholder representatives (n=6)</p> <p>Over 65 years</p>	<p>Processes that promote or inhibit nutrition in hospital</p>	<p>Finding 15: Food work in hospital requires staff to follow procedures and all staff engaging in serving meals should be able to complete these routines but also involve taking the initiative and understanding the older patients' (>65 years) perspective and to empathically assist when necessary. (U)</p> <p>Finding 16: Feeding assistance was often a key topic in the accounts of older patients (>65 years) and carers when discussing the problem of malnutrition in hospital. (U)</p> <p>Finding 17: Hospital staff identified a range of barriers to effective feeding of older patients (>65 years), including limited time and staff numbers, competing priorities or conflicting policies and issues regarding needs of particular patient groups. (U)</p>

				<p>Finding 18: Ward-based staff identified two older patients (>65 years) groups that required high levels of skill in feeding assistance and nutrition: those with swallowing difficulties following a stroke and patients with dementia. Feeding assistance was a valued activity, but the consequences of poor feeding activity were marked. (U)</p> <p>Finding 19: Food work is often described as common sense by staff, but this leads it to being overlooked and undervalued in practice. (U)</p>
<p>Study 14 Manning et al. (2012) Australia</p> <p>Hospital</p>	<p>Mixed methods - Interviews with patients</p>	<p>Patients (n=23) Mean 83.2 years (SD 8.9)</p>	<p>Experiences of volunteers, nurses and patients in relation to feeding assistance</p>	<p>Finding 20: Nurses and volunteers considered that the voluntary feeding assistance program was effective and helpful for older patients (>65 years) l. (U)</p>
<p>Study 9 Robison et al. (2015) UK</p> <p>Hospital</p> <p>Same study as Roberts et al. (2014)</p>	<p>Mixed methods</p> <p>This paper reports on Focus groups (n=3) Interviews</p> <p>Conducted 1 year before and after introduction of volunteer mealtime assistants on one ward and parallel comparison with a control ward</p>	<p><i>Interviews</i></p> <p>Baseline year Relatives (n=5) / Staff (n=9) Patients (n=10) >70 years</p> <p>Intervention year Relatives (n=5) / Staff (n=11) Patients (n=15) >70 years</p> <p><i>Focus Groups</i> Volunteers (n=12)</p>	<p>Experience and views of nutritional care of older inpatients from multiple perspectives</p>	<p>Findings 21 -24 relate to the pre-intervention year.</p> <p>Finding 21: Without support older patients (>65 years) developed their own strategies at mealtimes. (U)</p> <p>Finding 22: Older patients (>65 years) and relatives observed in their observations of staff that there were limitations and challenges to providing assistance at mealtimes and relatives wished more help was available. (U)</p> <p>Finding 23: Nurses highlighted a number of challenges and felt powerless to respond adequately at mealtimes and were unsure how to prioritize when so many older patients (>65 years) needed help. (U)</p> <p>Finding 24: Empowering ward leaders was considered important. (Un)</p> <p>Findings 25 to 39 relate to the post-intervention period.</p>

				<p>Finding 25: Staff described positive aspects of having trained volunteers who provided extra pairs of hands to support older patients (>65 years) enabling nurses to be available for other care. (U)</p> <p>Finding 26: Volunteers saw that the time they offered made a difference to older patients (>65 years) and nurses (U)</p> <p>Finding 27: Staff and patients appreciated that volunteers prepared all older patients (>65 years) for meals. (U)</p> <p>Finding 28: Volunteers had no doubt that preparing all older patients (>65 years) for mealtimes was worthwhile (U)</p> <p>Finding 29: Nurses observed that social interaction was important (Un)</p> <p>Finding 30: Older patients (>65 years) saw volunteers as a regular presence with potential to build relationships (Un)</p> <p>Finding 31: Volunteers thought that older patients (>65 years) respected them and might eat their meals but recognised that some older patients (>65 years) will not eat despite encouragement. (U)</p> <p>Finding 32: Nurses and volunteers recognised the benefit of having accurate information about older patients' (>65 years)' dietary intakes. (Un)</p> <p>Finding 33: Relatives were uncertain if their mother had been helped by a volunteer but welcomed the possibility, emphasising the benefits of encouragement and social interaction identified by staff: (C)</p> <p>Finding 34: Nurses respected the volunteers and good relationships and a sense of teamwork developed. (U)</p>
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				<p>Finding 35: Nurses praised the volunteers attitudes and saw them as committed and reliable. (Un)</p> <p>Finding 36: Nurses appreciate that the research team had trained the volunteers and took responsibility for them on the ward (U)</p> <p>Finding 37: Staff were hopeful that the volunteers would continue. (U)</p> <p>Finding 38: Staff described an increased awareness of the importance of nutrition and mealtime care as a result of volunteers providing assistance at mealtimes. (Un)</p> <p>Finding 39: Staff highlighted a synergy between other initiatives and the introduction of volunteers at mealtimes. (U)</p>
<p>Study 9 Roberts et al. (2014) UK Hospital</p>	<p>Mixed methods <i>Qualitative component</i> Focus groups (n=6) Interviews</p>	<p>Volunteers (n=12) / Staff (n=17) Patients (n=9) >70 years</p>	<p>Acceptability - Experiences of recruitment & training, & role of the mealtime assistant Perceptions of the role of volunteers</p>	<p>Finding 40: The volunteers were very positive about their contribution. (U)</p> <p>Finding 41: Volunteers were confirmed to be competent in each task. (U)</p> <p>Finding 42: Volunteers felt that their role could be initially challenging but grew more fulfilling with time. (U)</p> <p>Finding 43: Volunteers did find it difficult and upsetting at times but appreciated the training and ongoing support provided by the research team (Un)</p> <p>Finding 44: Nursing staff recognised the opportunity the trained volunteers gave them to perform other tasks. (U)</p> <p>Finding 45: Older patients (>65 years) and ward staff valued the volunteers' contributions. (U)</p> <p>Finding 46: Volunteers had a sense of achievement and valued the support from the valued being able to share their experience of</p>

				mealtime assistance at coffee mornings and focus groups. (U)
Study 15 Ross et al. (2011) Australia Hospital	Focus groups (n=3)	Dietitian (n=3) / Speech pathologist (n=2) Occupational therapist (n=3) / Pharmacist (n=1) Physiotherapist (n=2) / Dietetic assistant (n=2) Nurse (n=9) Working with patients over 65 years	Knowledge, attitudes and behaviour in relation to hospital nutrition	Finding 47: A potential barrier to nutritional care of older patients (>65 years) was poor knowledge of nutrition care processes, despite a shared awareness of the prevalence of malnutrition non-dietetic staff agreed they had limited nutritional knowledge and suggested a range of informal techniques for identifying patients' nutritional status. (U) Finding 48: A potential barrier to nutritional care of older patients (>65 years) was poor communication between disciplines. (U) Finding 49: A potential barrier to nutritional care of older patients (>65 years) was lack of role clarity and shared responsibility. (U) Finding 50: A potential barrier to nutritional care of older patients (>65 years) was competing priorities at mealtimes. (U) Finding 51: A potential barrier to nutritional care of older patients (>65 years) was that nurses felt a sense of powerlessness to prioritise nutrition in the hospital setting. (U) Finding 52: Staff suggestions for improving nutrition care older patients (>65 years) included allow family members to be "extra hands" on the wards at mealtimes so staff would have more time for other tasks. (U) Finding 53: Staff suggestions for improving nutrition older patients (>65 years) care included employing more staff on the wards at mealtimes. (U)
Study 16 Naithani et al. (2008) UK	Semi-structured interviews Informal observation of mealtimes (n=32)	Patients (n=48) Age 25-88 (data extracted for the 23 patients that were over 65 years)	Experiences of access to food in hospitals	Finding 54: Assisting and monitoring older patients (>65 years) at mealtimes seen as a low priority activity. (U) Finding 55: Older patients (>65 years) who experienced physical difficulties felt

Hospital			Perception of food, perceived dietary requirements, eating experience at mealtime, standard and acceptability of food and service, systems for food delivery and mealtimes, problems with hospital food and role of visitors	powerless to complain when staff interrupted mealtimes. (U)
Study 19 Walton et al. (2006) Australia Hospital	Focus group (n=17) Interviews (n=4)	Stakeholders working with long stay patients (n=98) Nurses (n=19) / Patients (n=14) / Dietitians (n=20), Nutrition assistants (n=11) / Food service managers (n=13) / Food service assistants (n=18) / Other health care staff (n=3)	Question What do you think about the meal service in hospitals	Finding 56: Older patients (>65 years) need assistance and preparation to eat and registered nurses are busy at mealtimes and feeding support is often more appropriately delegated to other staff. (U) Finding 57: Some stakeholders talked of the possibility of older patients (>65 years) eating in dining rooms and the value of greater socialisation and a more usual eating environment. (U)

Key: BMI – Body Mass Index; GS – Grip Strength; Hb – Haemoglobin; MAC – Mid Arm Circumference, MAMC - Mid Arm Muscle Circumference; PAMS -Professionals Allied to Medicine; RCT – Randomised Controlled Trial ; SD – Standard Deviation - Triceps Skinfold Thickness

Table 3: Included quantitative studies by JBI Levels of Evidence

JBI Levels of Evidence	Effectiveness	Included Studies	Citation
Level 1 Experimental Designs	1.a – Systematic review of Randomized Controlled Trials (RCTs)	--	Hickson et al., 2004, Duncan et al., 2006
	1.b – Systematic review of RCTs and other study designs	--	
	1.c – RCT	n=2	
	1.d – Pseudo-RCTs	--	
Level 2 Quasi-experimental Designs	2.a – Systematic review of quasi-experimental studies	--	Wright et al., 2006, Robinson et al., 2002 Huxtable and Palmer 2013, Young et al., 2011
	2.b – Systematic review of quasi-experimental and other lower study designs	--	
	2.c – Quasi-experimental prospectively controlled study	n=2	
	2.d – Pre-test – post-test or historic/retrospective control group study	n=2	
Level 3 Observational Analytic Designs	3.a – Systematic review of comparable cohort studies	--	Manning et al., 2012, Walton et al., 2008 Dube et al. ,2007/ Paquet et al, 2009
	3.b – Systematic review of comparable cohort and other lower study designs	--	
	3.c – Cohort study with control group	--	
	3.d – Case – controlled study	n=2	
	3.e – Observational study without a control group	n=1	
Level 4 Observational Descriptive Studies	4.a – Systematic review of descriptive studies	--	Walton et al. 2012, 2013 Tsang, 2008, Buys et al, 2013, Roberts et al., 2014 / Robison et al., 2015
	4.b – Cross-sectional study	n=2	
	4.c – Case series	n=3	
	4.d – Case study	--	
Level 5 Expert Opinion and Bench Research	5.a – Systematic review of expert opinion	--	
	5.b – Expert consensus	--	
	5.c - Bench research/ single expert opinion	--	

Table 4: Textual synthesis of effectiveness data

Synthesis	Description
TSE1	Lunch time and daily energy intake, breakfast, lunch time and daily protein intake can be increased in patients (>65 years) in hospital settings when trained volunteers are present to provide support
TSE2	Daily energy intake, nutritional status, mortality four months post discharge can be increased in patients (>65 years) in hospital settings when employed assistants are present to provide support
TSE3	Lunch time energy intake can be increased in patients (>65 years) in hospital settings when they eat their meals in a supervised dining room as opposed to on the ward
TSE4	Eating in a communal dining room in hospital settings is associated with better protein intake for patients (>65 years)

Table 5: Recommendations for clinical practice and policy decision making

Recommendations	Grade
From synthesis 1 we recommend that	
Strategies could be put in place in hospital settings to ensure that protected mealtimes are successful	B
Ward staff should avoid interrupting patients (> 65 years) whilst they are eating and prioritise assisting with food where this is required	A
Sufficient protected time should be made available to allow patients (> 65 years) in hospital settings time to eat	A
Ward staff could spend time with patients (> 65 years) who are unwell or have a poor appetite, to encourage sufficient food intake where appropriate to the patient's condition	B
From synthesis 2a we recommend that:	
Staff and employed assistants should be encouraged to provide support at mealtimes to support patients (>65 years) in hospital settings and rehabilitation units.	A
Relatives/visitors should be encouraged to visit at mealtimes to support patients (>65 years) in hospital settings and rehabilitation units	A
The use of volunteers to provide mealtime support for patients (>65 years) in hospital settings and rehabilitation units should be encouraged	A
From synthesis 2b we recommend that	
Dining rooms could be used for mealtimes for patients (>65 years) in hospital settings and rehabilitation units.	B
From synthesis 3 we recommend that	
Volunteers could be trained and have support mechanisms in place.	B
All members of the multi-disciplinary team need to be aware of nutrition care processes and ensure that patients (>65 years) nutritional needs are identified and addressed as part of individual care plans. These plans could provide role clarity and identify individual responsibilities for meeting the nutritional needs of each older patient which can then be clearly communicated to volunteers staff	B

Table 6: Critical appraisal scores for included studies by study type

	Randomized control/ pseudo-randomized trials										
Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score
Duncan et al., 2006	Y	N/A	N/A	Y	UC	Y	Y	Y	Y	Y	7/8
Hickson et al., 2004	Y	N/A	N/A	Y	N	N	Y	Y	Y	Y	6/8
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9		
Robinson et al., 2002	UC	Y	UC	Y	UC	N/A	N/A	UC	UC		2/7
Wright et al., 2006	Y	Y	N	N	Y	N/A	N/A	Y	Y		5/7
Young et al., 2013	Y	N	N	Y	Y	N/A	N/A	Y	Y		5/7
	Descriptive/case series studies										
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9		
Buys et al., 2013	N	N	N	Y	N/A	N/A	N/A	Y	Y		3/6
Dube et al., 2007	N	Y	Y	Y	N/A	N/A	N/A	Y	N		4/6
Huxtable and Palmer 2013	N	Y	N	Y	Y	N/A	N/A	Y	Y		5/7
Manning et al., 2012	N	Y	N	Y	Y	N/A	N/A	Y	Y		5/7
Paquet et al., 2008	N	Y	Y	Y	N/A	N/A	N/A	Y	N		4/6
Roberts et al., 2014	N	N	N/A	UC	N/A	N/A	N/A	UC	Y		1/5
Tsang, 2008	N	Y	N	Y	N/A	N/A	N/A	Y	Y		4/6
Walton et al., 2008	N	N	N	Y	N/A	N/A	N/A	Y	N		2/6
Walton et al., 2012	N	Y	N	Y	N/A	N/A	N/A	UC	Y		3/6
Walton et al., 2013	N	N	N	UC	N/A	N/A	N/A	U/C	Y		1/6
	Qualitative studies										
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
Dickinson et al., 2008	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
Heaven et al., 2013	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
Manning et al., 2012	N	Y	Y	N	N	N	N	N	Y	N	3/10
Naithani et al., 2008	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
Roberts et al., 2014	UC	Y	Y	Y	UC	N	N	N	Y	UC	4/10
Robison et al., 2015	UC	Y	Y	Y	N	N	N	Y	Y	N	5/10
Ross et al., 2011	UC	Y	Y	Y	Y	N	N	Y	Y	Y	6/10
Walton et al., 2013	N	Y	Y	Y	Y	N	N	UC	Y	Y	6/10
Walton et al., 2006	UC	Y	Y	Y	N/A	Y	N	UC	Y	Y	6/9

Y=Yes, N=No, UC=Unclear, N/A=not applicable

See supplementary file 4 for description of individual questions for each study type

Figure 1: Search Strategy

Electronic database searched for published papers from January 1998 to September 2015:

- CINAHL
- MEDLINE
- British Nursing Index
- Cochrane Central Register of Controlled Trials,
- EMBASE
- PsychINFO
- Web Of Science

Search terms used

Setting:

Hospitals, hospital\$, ward\$, unit\$, healthcare setting\$, rehabilitation unit\$

Population:

Exp adult/, adult\$, patient\$

(A number of searches were undertaken using "elderl" but key papers were missed. It was therefore decided not to be specific but to undertake a broader search, that was extensive and then screen the papers thoroughly)

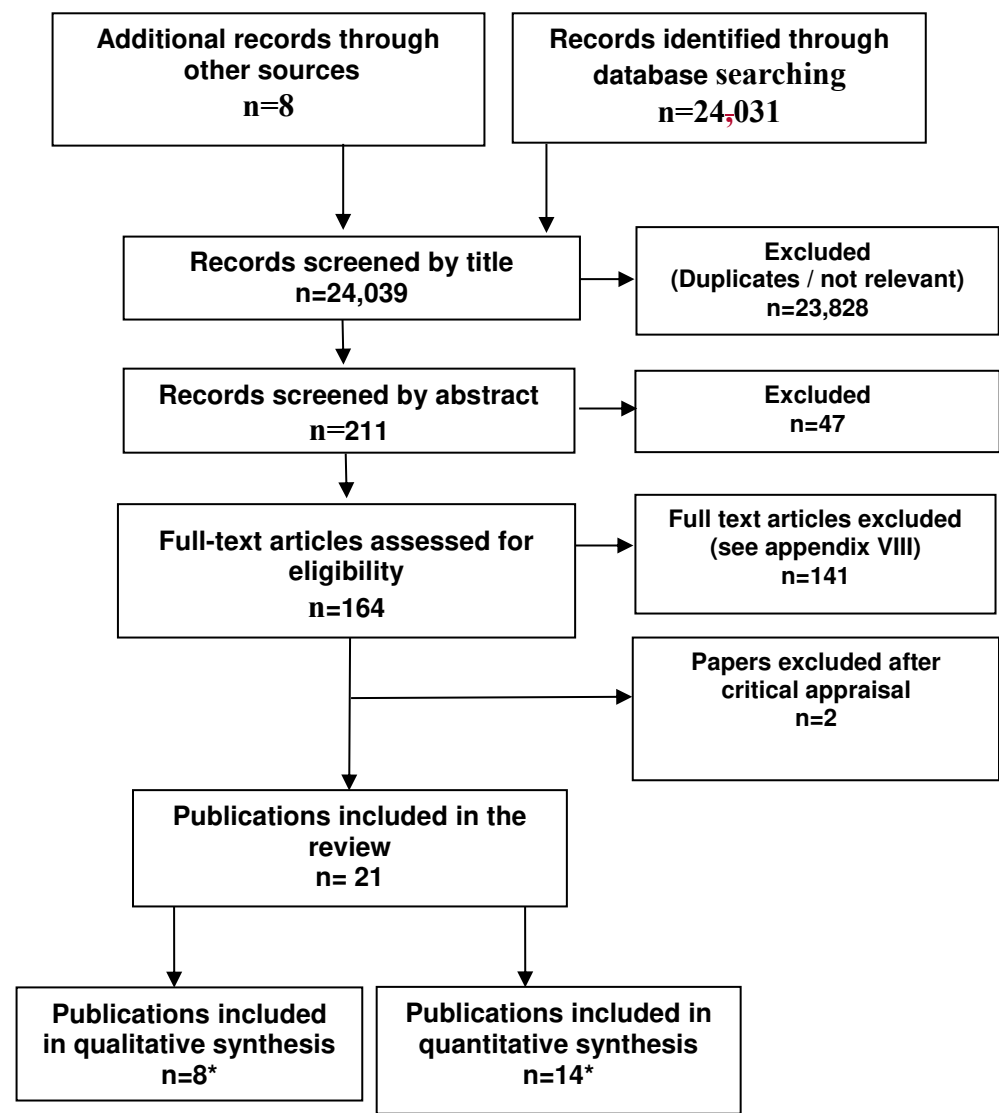
Mealtimes:

meal\$, feed\$; food, lunch\$, eat\$, diet\$

Assistance:

assist\$, help\$, Volunt\$, Support\$

Figure 2: Flow of studies



* Three mixed methods studies contributed both qualitative and quantitative data to the review